Arizona Drought Monitor Report

October 2006

Produced by the Monitoring Technical Committee

Mike Crimmins, Extension Specialist, U of A Cooperative Extension

Charlie Ester, Salt River Project

Gregg Garfin, University of Arizona – CLIMAS

Tony Haffer, National Weather Service

Larry Martinez, Natural Resources Conservation Service

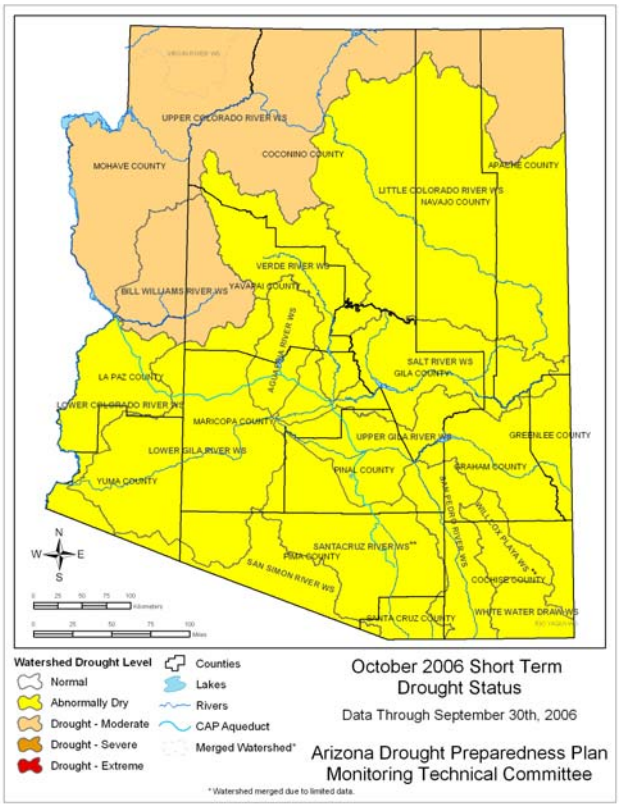
Ron Ridgway, Arizona Division of Emergency Management

Nancy Selover, Asst. State Climatologist Arizona State University

Chris Smith, U.S. Geological Survey

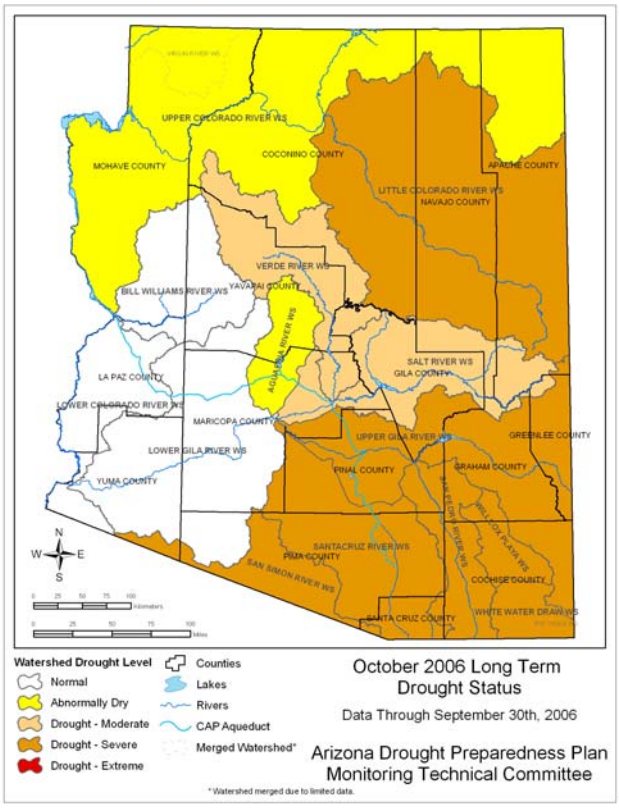
Coordinator: Susan Craig, Arizona Department of Water Resources
Computer Support: Andy Fisher, Arizona Department of Water Resources

Arizona Department of Water Resources



Short-term Drought Status

Improvement in the short-term drought status that began with the monsoon has continued through September, with the Lower Gila, Agua Fria and Verde watersheds improving from moderate drought to abnormally dry status. In the central and southern parts of the state, rangeland, soil moisture and stock ponds are in relatively good condition. The northern portion of the state continues to suffer from very dry conditions, particularly the northeast plateau.



Long-term Drought Status

The southwest and west central watersheds have reached normal levels, while the northern tier remains abnormally dry in the long-term. Long-term drought is most apparent in the east and southeast where several dry winters have devastated vegetation. Although 2005 was a record wet winter, the 2006 water year is shaping up to be the fifth driest on record. Recent monsoon rainfall is insufficient to erase the long-term soil moisture deficits. The situation should improve with a moderate El Niño forecast for the winter of 2006-2007.

Reservoir Storage

Arizona Reservoir Status

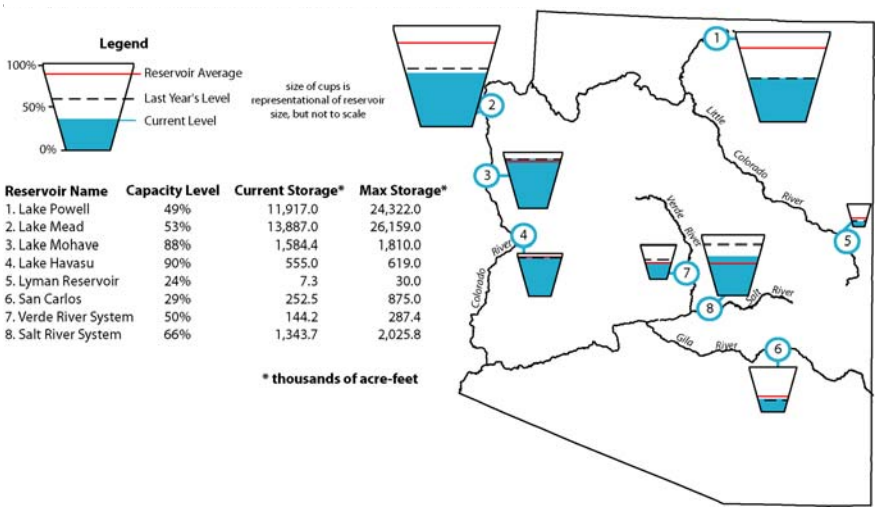
Total water storage in Arizona declined by less than one percent of capacity since last month. The total in-state storage remains at 54 percent of capacity. Storage on the Salt River fell from 68 to 66 percent, while lake levels on the Verde River system rose from 49 to 50 percent of capacity. The San Carlos Reservoir on the Gila River rose by 5 percent. Total storage on the Colorado River fell slightly, from 53.5 percent last month to 52.8 percent of capacity. The two largest reservoirs, Lake Powell and Lake Mead, declined by less than one percent each, while Lake Mohave and Lake Havasu fell by 6 percent and 4 percent, respectively.

Total storage for the in-state reservoirs is lower than it was one year ago, when it stood at 66 percent of capacity after having been replenished by the abundant rain and snow received during the 2004–2005 winter. Despite the depletion caused by the virtual absence of rain and snowpack during the winter of 2005–2006, the total in-state water storage is currently at about 114 percent of the long-term average. Storage on the Colorado River stands at about 66 percent of the long-term average, slightly less than at this time last year, when it was at about 69 percent of average.

The Bureau of Reclamation, which oversees the lower Colorado River, has announced the beginning of a series of experiments designed to improve water supply from the river by reducing waste and improving efficiency on the Colorado (*Arizona Republic*, September 27). Key proposals in the plan include 1) a test to restart the desalination plant at Yuma to remove salt from agricultural runoff, 2) construction of a small reservoir near Yuma along the All-American Canal to temporarily store water allocated for farmers' use if it cannot be immediately used, and 3) a program to pay some California farmers to leave some land unplanted, allowing the saved water to remain in Lake Mead.

(Data provided by USDA-NRCS)

Arizona reservoir levels for September 2006 as a percent of capacity. The map depicts the average level and last year's storage for each reservoir, while the table also lists current and maximum storage levels.



Reservoir Name	Capacity Level	Current Storage*	Max Storage*
1. Lake Powell	49%	11,917.0	24,322.0
2. Lake Mead	53%	13,887.0	26,159.0
3. Lake Mohave	88%	1,584.4	1,810.0
4. Lake Havasu	90%	555.0	619.0
5. Lyman Reservoir	24%	7.3	30.0
6. San Carlos	29%	252.5	875.0
7. Verde River System	50%	144.2	287.4
8. Salt River System	66%	1,343.7	2,025.8

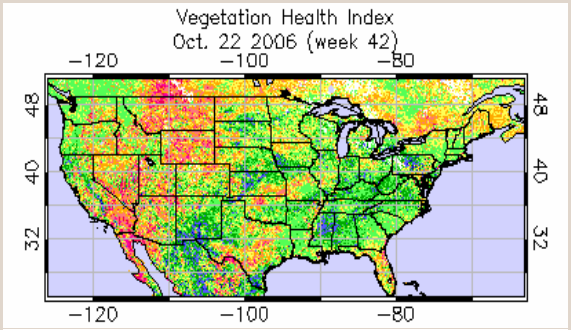
* thousands of acre-feet

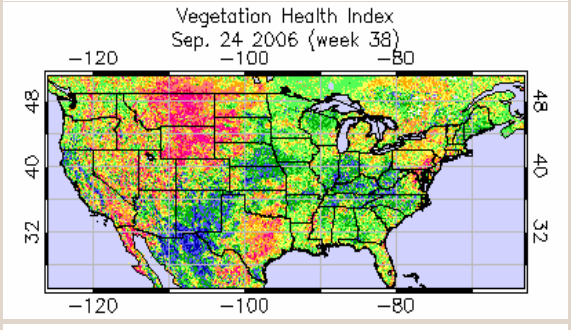
Data provided by USDA-NRCS, graphic provided by University of Arizona - CLIMAS (Climate Assessment for the Southwest)

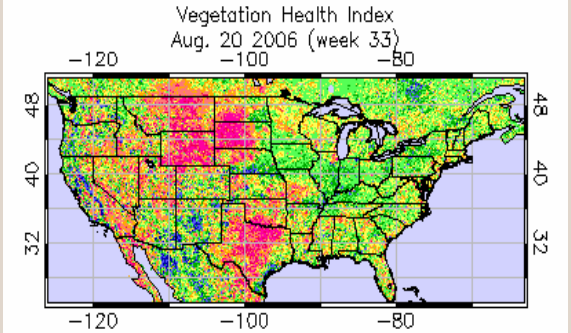
Vegetation Health

Conditions in Arizona have deteriorated somewhat since late September, particularly in southeastern Arizona and at higher elevations along the Mogollon Rim. Vegetation health typically peaks in response to moisture availability. Deteriorations are a typical vegetation response to a return to normal, dry, fall seasonal conditions since the end of the monsoon season.

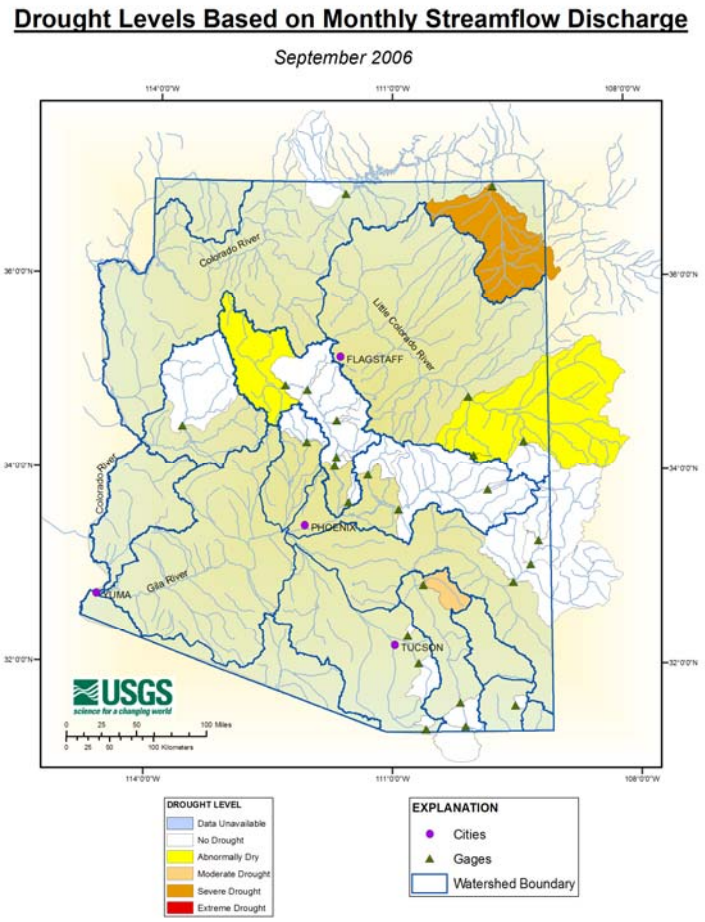
Satellite-derived images from the NOAA National Environmental Satellite, Data and Information Service (NESDIS) were taken October 22, 2006 (top figure), September 24, 2006 (middle figure) and Aug. 20, 2006 (bottom figure).







Mountain Streamflow and Precipitation



September Streamflow

High runoff volumes were recorded in most basins (see table below) thanks to significant rainfall generated by the monsoon. Soil moisture is fair to good across the mountain watersheds of northern Arizona, providing good antecedent conditions for the coming winter.

September Streamflow Observed (compiled by NRCS from USGS data)

Water body	August Runoff in Acre Feet	% of Median
Salt River near Roosevelt	41,878	222%
Tonto Creek	1,256	109%
Verde River at Horseshoe Dam	14,384	98%
Combined Inflow to Salt River Project (SRP) reservoir system	57,518	156%
Little Colorado River above Lyman Lake	2,030	406%
Gila River to San Carlos Reservoir	70,580	1008%

Mountain Precipitation

September Precipitation

Climate data from high elevation monitoring stations show that precipitation for September 2006 was 68 percent of average over the Salt River basin, 92 percent of average over the Verde River basin, and 92 percent of average over the San Francisco-Upper Gila River basin. The Little Colorado River basin received 78 percent of average precipitation in September.

Water Year Precipitation by River Basin

Despite an extremely potent monsoon, the heavy rainfall in July and August was not enough to overcome the moisture deficit from the exceptionally dry winter of 2006. Cumulative mountain precipitation for the water year remains below average in all basins ranging from 60 to 92 percent of average (see table to the right).

Watershed	Percent (%) of 30-Yr. Average Water Year Precipitation October 1 – Sept. 30
Salt River Basin	73%
Verde River Basin	58%
Little Colorado River Basin	65%
San Francisco-Upper Gila River Basin	91%
Central Mogollon Rim	56%

Temperature and Precipitation


Update

September brought above-average rainfall to central and southern Arizona, while the northern third of the state had average or slightly below-average rainfall. The southeast and northwest corners of the state again had cooler than normal temperatures for the second month in a row, while the northeast and southwest were near or slightly above average for temperature.

Three-month period – As a result of the wet monsoon, precipitation was well above normal across the state, with the Upper Colorado basin near average. The temperatures ranged from the 25th percentile in the southeast corner to the 90th percentile in the southwest corner of the state.

Six-month period – The central and southern watersheds are still above the 60th percentile for precipitation. The Upper Colorado and Bill Williams received slightly less than average precipitation. As a result of dropping the cool wet month of March from the 6-month period, the temperatures across the state for the past six months are all above the 75th percentile, and most of the southern and western parts of the state were above the 85th temperature percentile.

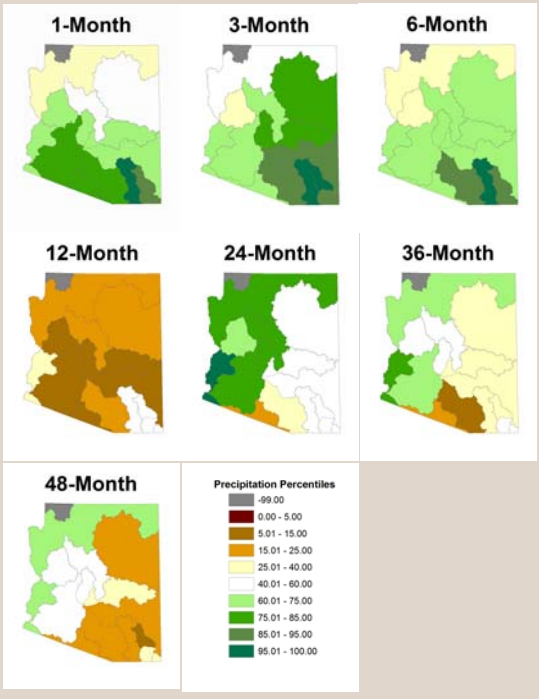
Twelve-month period - This period continues to show the effects of a very dry winter of 2005. All watersheds, except the Willcox Playa and White Water Draw in the southeast and the Lower Colorado in the southwest, remain below the 25th percentile. The replacement of the dry September of 2005 with the wet September of 2006 led to some improvement in the 12-month period, particularly on the Northeast plateau. The corresponding temperatures for the one-year period remain extremely high, above the 85th percentile everywhere except the northeast corner of the state, which is above the 75th percentile.

Two-year period - Over the two-year period, the eastern half of the state is below the 40th percentile for precipitation and the western half is above the 60th percentile. The monsoon rainfall improved the southeast areas considerably. The 24-month temperatures remain well above the 75th percentile of most areas, with the southeast climate division at the 99th percentile.

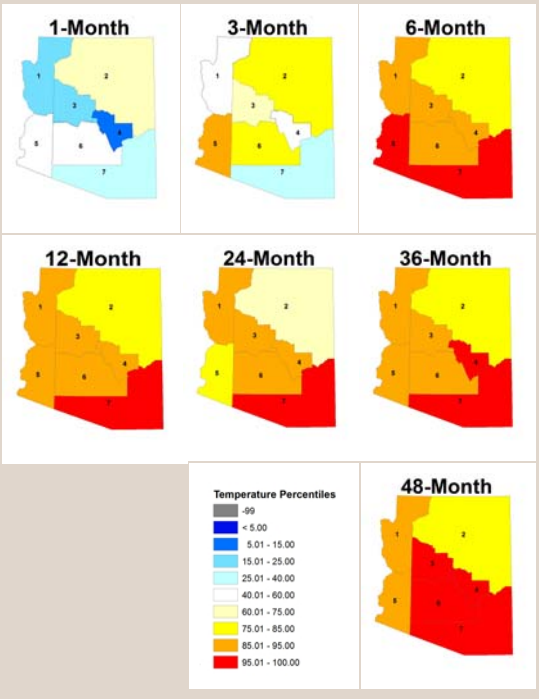
Three-year period - There is still little change in precipitation percentiles since the September update, with the western half of the state remaining near above-average, while the eastern half of the state is still below average. The Santa Cruz and San Simon watersheds at the 12th and 21st percentiles, respectively. The entire state is still above the 75th percentile for temperature, but climate division 6 dropped below the 95th percentile this month. Climate divisions 4 and 7 in the southeast remain above the 95th percentile for temperature.

Four-year period - The Little Colorado watershed has finally moved above the 25th percentile for precipitation in the four-year period. There is little change in the other watersheds. The eastern watersheds remain below average while the western watersheds remain near or above normal. Recent months of monsoon moisture have not changed the excessive heat pattern evident over the past four years. Temperatures have remained above the 95th percentile in the southeast and south central climate divisions, and above the 75th percentile elsewhere in the state.

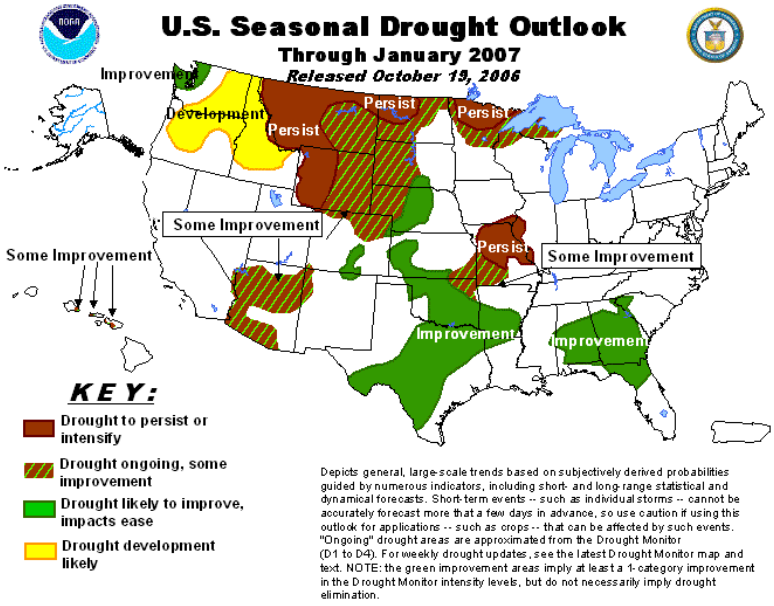
Precipitation Percentiles by Watershed



Temperature Percentiles by Climate Division



Weather Outlook



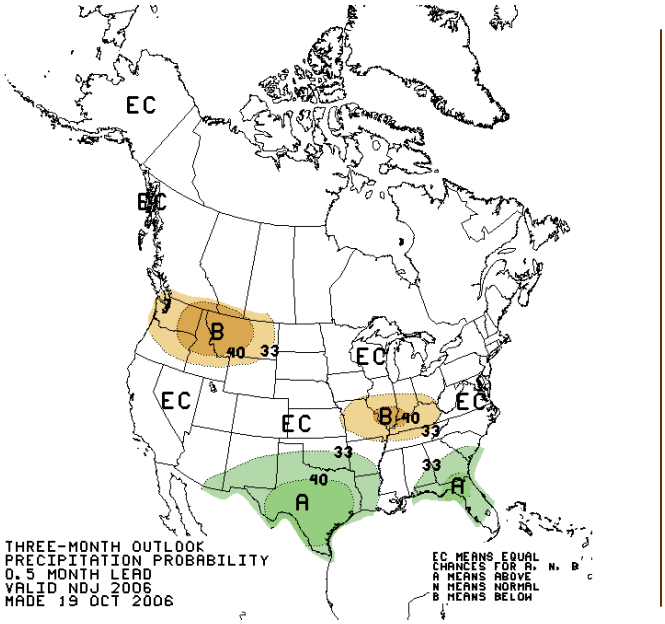
Drought Outlook

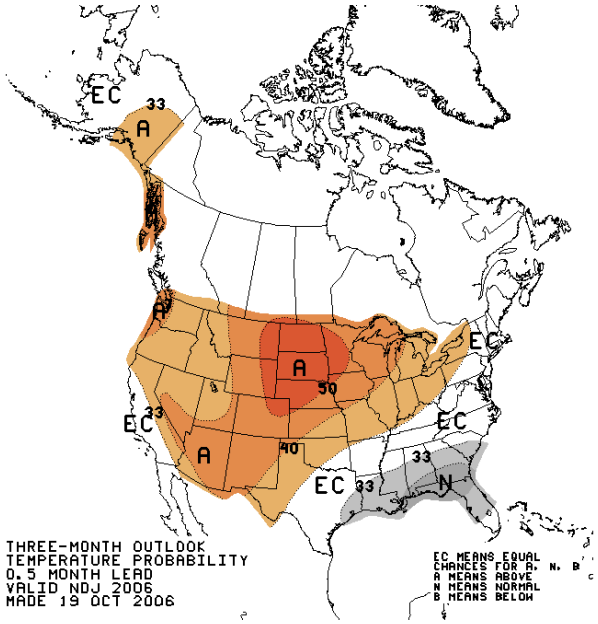
The CPC Seasonal Drought Outlook (left) indicates most of the state will continue to see some improvement with lessening of some of the drought impacts by January 2007. Worthy of note is the continued evolution of what might eventually become a moderate El Niño event in the eastern Pacific Ocean. It is still too early to tell what impact this will have on Arizona's winter, but history shows that in similar situations, precipitation in Arizona showed a tendency to be above normal, especially after January 1st. In fact, the CPC precipitation outlook for Arizona during the months of January through March 2007 indicates some confidence precipitation will be above normal.

Also see the most current Southwest Climate Outlook -
www.ispe.arizona.edu/climas/forecasts/swoutlook.html

For additional weather information from the Office of the State Climatologist for Arizona -
http://geography.asu.edu/azclimate

November to January Weather Outlooks





Precipitation

Equal chances for above average, average, and below average precipitation across most of the state, with a slight amount of confidence precipitation will be above normal in the extreme southeast part of the state.

Temperature

Moderate confidence level that temperatures will be above average.

NOAA's CPC Outlooks are 3-category forecasts. As a starting point, the 1971–2000 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the "average" category is preserved at 33.3 likelihood, unless the forecast is very strong. Thus, using the NOAA-CPC temperature (precipitation) outlooks, areas with light brown (green) shading display a 33.3–39.9 percent chance of above-average, a 33.3 percent chance of average, and a 26.7–33.3 percent chance of below-average temperature (precipitation). A shade darker indicates a higher than 40.0 percent chance of above-average, a 33.3 percent chance of average, and a further reduced chance of below-average temperature, and so on. Equal Chances (EC) indicates areas with an equal likelihood of above-average, average, or below-average conditions; it is used by forecasters when the forecast tools do not indicate a strong "signal" that conditions during a given period will be in any one of the three categories.